

## AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A regional tunnel management method in a mobile communication system using Mobile IP, the mobile communication system including a mobile node, a first GGSN (Gateway GPRS (General Packet Radio Service) Support Node) serving as a foreign agent for storing location information of the mobile node, a second GGSN for storing location information of the first GGSN, and a home agent connected to the second GGSN, for performing data communication with a correspondent node, the method comprising the steps of:

~~transmitting a location registration request from the mobile node to the first GGSN, upon receiving an Agent Advertisement message with an address of the second GGSN and information indicating that the first GGSN supports a foreign agent function, said Agent Advertisement message being transmitted by the first GGSN~~transmitting by the first GGSN an Agent Advertisement message with an address of the second GGSN and information indicating that the second GGSN supports a foreign agent function;

receiving said Agent Advertisement message by the mobile node and transmitting a location registration request from the mobile node to the first GGSN;

transmitting the location registration request from the first GGSN to the second GGSN, the location registration request including the address of the first GGSN to which the mobile node belongs; and

registering by the second GGSN an address of the first GGSN to which the mobile node belongs, and transmitting by the second GGSN ~~then transmitting to the home agent,~~ during a re-registration, a Location Information message indicating the address of the first GGSN to which the mobile node belongs.

2. (Original) The method as claimed in claim 1, wherein the location registration request transmitted by the mobile node includes the address of the first GGSN to which the mobile node belongs.

3. (Original) The method as claimed in claim 1, wherein the Agent Advertisement message is transmitted through a tunnel between the mobile node and the first GGSN.

4. (Previously Presented) The method as claimed in claim 1, further comprising the steps of:

determining by the home agent whether a destination address of data received from the correspondent node is identical to the address of the second GGSN, upon receiving data destined for the mobile node from the correspondent node; and

transmitting the data to the second GGSN, if the destination address of the data is identical to the address of the second GGSN.

5. (Original) The method as claimed in claim 4, further comprising the step of transmitting the data to the first GGSN from the home agent, if the destination address of the data is not identical to the address of the second GGSN.

6. (Original) The method as claimed in claim 1, wherein the Location Information message includes the address of the first GGSN and the address of the second GGSN.

7. (Currently Amended) A regional tunnel management method in a mobile communication system using Mobile IP, ~~the mobile communication system including a mobile node, a first GGSN (Gateway GPRS (General Packet Radio Service) Support Node) serving as a foreign agent for storing current location information of the mobile node or serving as a gateway foreign agent for foreign agents existing in a specific region, and a home agent connected to the first GGSN, for performing data communication with a correspondent node,~~ the method comprising the steps of:

~~creating by the mobile node a GTP (GPRS Tunneling Protocol) tunnel and receiving through the created GTP tunnel an Agent Advertisement message indicating whether a second GGSN serves as the foreign agent or the gateway foreign agent, if the mobile node enters a region of the second GGSN~~creating by a mobile node a GTP (GPRS

Tunneling Protocol) tunnel and receiving through the created GTP tunnel an Agent Advertisement message from a second GGSN (Gateway GPRS (General Packet Radio Service) Support node), when the mobile node moves from a current region of a first GGSN to a new region of the second GGSN;

said Agent Advertisement message indicating whether the second GGSN serves as a foreign agent or a gateway foreign agent,

wherein the first GGSN of the first region serves as the foreign agent for storing location information of the mobile node when the mobile node is in the first region, and serves as the gateway foreign agent for the foreign agent when the mobile node is in the second region;

transmitting a first registration request message for requesting location registration from the mobile node to the second GGSN, if the second GGSN serves as the foreign agent;

transmitting a second registration request message for requesting the location registration for the mobile node from the second GGSN to the first GGSN, if the first GGSN serves as the gateway foreign agent; and

transmitting a Location Information message indicating location information of the mobile node from the first GGSN to the home agent, upon receiving the second registration request message, the home agent further performing data communication with a correspondent node.

~~transmitting, during a re-registration, a Location Information message indicating location information of the mobile node from the first GGSN to the home agent, upon receiving the second registration request message.~~

8. (Original) The method as claimed in claim 7, wherein the Location Information message includes an IP address of the first GGSN and an IP address of the second GGSN.

9. (Previously Presented) The method as claimed in claim 7, further comprising the steps of:

transmitting the Location Information message indicating the location information of the mobile node from the second GGSN to the home agent, upon receiving the first registration request message, if the second GGSN serves as the gateway foreign agent.

10. (Original) The method as claimed in claim 7, further comprising the step of, upon receiving data destined for the mobile node from the correspondent node after receiving the Location Information message, transmitting the received data from the home agent to the second GGSN to which the mobile node is currently connected.

11. (Previously Presented) A regional tunnel management method in a mobile communication system using Mobile IP, the method comprising the steps of:

moving by a mobile node from a current region of a second GGSN (Gateway GPRS (General Packet Radio Service) Support node) to a new region of a first GGSN,

wherein the first GGSN serves as a foreign agent for storing location information of the mobile node, the second GGSN stores location information of the first GGSN, and a home agent is connected to the second GGSN for performing data communication with a correspondent node;

transmitting by the first GGSN an Agent Advertisement message with an address of the second GGSN and information indicating that the first GGSN supports a foreign agent function;

receiving said Agent Advertisement message by the mobile node and transmitting a location registration request from the mobile node to the first GGSN,

transmitting the location registration request from the first GGSN to the second GGSN, the location registration request including the address of the first GGSN to which the mobile node belongs; and

registering by the second GGSN an address of the first GGSN to which the mobile node belongs, and transmitting by the second GGSN to the home agent, a location information message indicating the address of the first GGSN to which the mobile node belongs.

**12. (Previously Presented) A regional tunnel management method in a mobile communication Mobile IP, the method comprising the steps of:**

**creating by a mobile node a GTP (GPRS Tunneling Protocol) tunnel and receiving through the created GTP tunnel an Agent Advertisement message from a second GGSN (Gateway GPRS (General Packet Radio Service) Support node), when the mobile node moves from a current region of a first GGSN to a new region of the second**

**GGSN;**

**said Agent Advertisement message indicating whether the second GGSN serves as a foreign agent or a gateway foreign agent;**

**wherein the first GGSN of the first region serves as the foreign agent for storing location information of the mobile node when the mobile node is in the first region, and serves as the gateway foreign agent for the foreign agent when the mobile node is in the second region;**

**transmitting a first registration request message for requesting location registration from the mobile node to the second GGSN, if the second GGSN serves as the foreign agent;**

**transmitting a second registration request message for requesting the location registration for the mobile node from the second GGSN to the first GGSN, if the first GGSN serves as the gateway foreign agent; and**

**transmitting a Location Information message indicating location information of the mobile node from the first GGSN to a home agent, upon receiving the second registration request message, the home agent further performing data communication with a correspondent node.**